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NEW SPECIES OF HYLID FROGS FROM THE ANDES OF COLUMBIA AND VENEZUELA

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Until recently, hylid frogs of the genus *Hyla* were thought to be poorly represented in the Andes. Cochran and Goin (1970) recognized three species in the *Hyla variabilis* group, one in the *Hyla labialis* group, and one in the *Hyla bogotensis* group in the Andes of Colombia. In addition, *Hyla platydactyla* and *H. lascinia* were recognized in Venezuela (Rivero, 1961, 1969).

Including the species named herein, 25 species of *Hyla* are known in the Andes north of the Huancabamba Depression in extreme northern Peru. These may be arranged in what seem to be four natural groups. The *Hyla bogotensis* group consists of 13 species, all but one of which are restricted to the Andes. Members of this group inhabit streams in montane cloud forests from Costa Rica to the Mérida Andes in Venezuela and the Amazonian slopes of the Andes in Peru (Duellman, 1972; Duellman and Altig, 1978; Ruíz and Lynch, 1982; Myers and Duellman, 1982; La Marca, 1985). The *Hyla labialis* group consists of three species in the Cordillera Oriental of Colombia and Venezuela and in the Mérida Andes. The *Hyla columbiana* group (=*Hyla variabilis* group of Cochran and Goin, 1970) contains three species in the Cordillera Occidental of Ecuador and Colombia and the upper valleys of the Río Cauca and Río Magdalena in Colombia (Duellman and Trueb, 1982). The large stream-dwelling species of the *Hyla larinopygion* group were first discovered in 1971. The seven known species have restricted distributions in upper montane cloud forests in Ecuador and Colombia (Duellman, 1973; Duellman and Altig, 1978; Duellman and Berger, 1982; Ruíz and Lynch,

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1982; Duellman and Hillis, in press).

HYLA BOGOTENSIS GROUP

Two of the new species are members of this group that is defined as follows: (1) moderate-sized, stream-breeding frogs with males attaining snout-vent lengths of 45 mm and females 53 mm; (2) round mental gland in males; (3) dorsum green or pale brown with or without dark flecks; (4) digits bearing small discs; (5) toes about three-fourths webbed; (6) axillary membrane absent; (7) quadratojugal articulating with maxillary; (8) nasals small, widely separated medially; (9) frontoparietal fontanelle large; (10) sphenethmoid broad, not ossified anteriorly; (11) tadpoles having long muscular tails, low fins, ventral mouths completely bordered by papillae, and 4 or 5 upper and 8 to 10 lower rows of denticles; (12) advertisement calls consisting of series of short, loud peeps.

Hyla callipeza new species
Fig. 1

Holotype.—KU 169567, an adult female, from 18.5 km (by road) S of Chitagá (07°02'N, 72°40'W, 2850 m), Departamento de Norte de Santander, Colombia, obtained on 23 August 1974 by William E. Duellman.

Paratopotypes.—KU 169568–70 collected with the holotype.

Referred Specimen.—KU 169566 from 32 km (by road) W of Sardinata, 1050 m, Departamento Norte de Santander, Colombia, obtained on 4 July 1974 by John E. Simmons.

Diagnosis.—(1) Webbing not extending to distal subarticular tubercle on fourth finger; (2) distal subarticular tubercle on fourth finger bifid; (3) ulnar fold absent; (4) inner and outer tarsal folds absent; (5) calcar absent; (6) snout truncate in profile; (7) tympanic annulus barely evident; (8) supratympanic, tarsal, and supra-anal white stripes present.

Four other species in the *Hyla bogotensis* group lack ulnar and tarsal folds, as well as calcars. Of these, *H. platydactyla* and *H. simmonsi* lack supratympanic, tarsal, and supra-anal stripes, and *H. jahni* has only a supratympanic stripe. The tympanic annulus is distinct in *H. jahni* and *H. platydactyla*, and completely covered in *H. torrenticola*. The snout is round in profile in *H. torrenticola*, and in *H. simmonsi* it is posteroventrally inclined from the tip to the margin of the lip.

Description.—Body robust; head narrower than body, slightly narrower than long; head width 34.8–35.6 ($\bar{x}$=35.2, n=2) percent of snout-vent length; snout moderately long, narrowing to truncate tip in dorsal view, truncate in profile; canthus angular; loreal region noticeably concave; lips not flared; nares about five-sixths distance from eye to tip of snout, not protuberant, directed anterolaterally; internarial region flat; top of head flat; interorbital

Fig. 1. Holotype of *Hyla callipeza*, KU 169567, female, 33.0 mm SVL.

distance much greater than width of eyelid; supratympanic fold weak, curved from posterior corner of eye to point above insertion of forelimb, obscuring upper part of tympanum; tympanic annulus barely evident; tympanum separated from eye by a distance slightly greater than diameter of tympanum.

Forearm moderately robust; ulnar fold and tubercles absent; hand large; fingers moderately short, bearing round discs; width of disc on third finger half again diameter of tympanum; relative length of fingers 1<2<4<3; lateral fringes absent on fingers; webbing absent between Fingers I and II, vestigial between Fingers II and III; webbing formula for outer fingers **III** (2^{+}–$2^{1}/2$)—(2–$2^{1}/2$)**V**; subarticular tubercles moderately large, round; distal tubercle on fourth finger bifid; supernumerary tubercles prominent on proximal segments; palmar tubercle small, indistinct; prepollical tubercle large, ovoid. Hind limbs moderately slender; tibia length 50.9–52.9 ($\bar{x}$=51.9, n=2) percent of snout-vent length; foot length 49.5–49.7 ($\bar{x}$=49.6, n=2) percent of snout-vent length; tarsal fold absent; inner metatarsal tubercle low, elongate; outer metatarsal tubercle absent; toes moderately short, bearing discs slightly smaller than those on fingers; relative length of toes 1<2<3=5<4; toes about two-thirds webbed; webbing formula **I**2—2**II**$1^{1}/2$—(2–2^{+}) **III**$1^{1}/2$—2^{+}**IV**2^{+}—$1^{1}/2$**V**; subarticular tubercles moderately large, round; supernumerary tubercles small, present only on proximal segments.

Skin on dorsum smooth; skin on chest, belly, and ventral surfaces of thighs granular; other surfaces smooth; anal region slightly swollen; anal opening directed posteroventrally and midlevel of thighs; anal sheath moderately

long; anal folds and tubercles absent. Vomerine odontophores transverse ridges between posterior margins of ovoid choanae, narrowly separated medially, each bearing 5–7 teeth; tongue broadly cordiform, broadly notched posteriorly, barely free behind.

Color in preservative: Dorsum brown; dark brown canthal stripe; venter cream; suffusion of brown on margin of lower lip.

Coloration in life: By day pale cream; later changed to dull brownish green; flanks, anterior and posterior surfaces of thighs, and webbing pale orange; supratympanic, ulnar, and tarsal stripes and anal tubercles creamy white; iris bronze with fine black reticulations.

Measurements: The measurements for two females (in mm with means in parentheses) are: snout-vent length 32.3–33.0 (32.7), tibia length 16.8–17.1 (17.0), head width 11.5, head length 12.0–12.2 (12.1), interorbital distance 3.2–3.3 (3.3), eyelid width 2.3–2.5 (2.4), eye-nostril distance 2.7–3.0 (2.9), diameter of eye 3.1–3.2 (3.2), diameter of tympanum 1.5. Three juveniles have snout-vent lengths of 24.5–25.6 ($\bar{x}$=24.9).

Ecology and Distribution.—The individual from 32 km W of Sardinata was perched on a bush at night over a stream in a ravine containing remnants of cloud forest. The type locality is a stream in grazed subparamo-páramo ecotone with remnants of upper montane cloud forest along the stream. Three frogs were in terrestrial bromeliads along the stream by day, and one was under the stalk of a fallen *Espeletia* (Asteraceae) by day.

Both localities are on the eastern slopes of the Cordillera Oriental (Fig. 2). Much of this region of the Andes has been denuded of natural vegetation. Overgrazing has resulted in extensive erosion, so that in many places only bedrock remains. Remnants of cloud forest are restricted to deep ravines. In these scattered refuges it is possible to find numerous species of frogs in the genera *Eleutherodactylus*, *Cryptobatrachus*, *Centrolenella*, and *Colostethus*.

Etymology.—The specific epithet is derived from the Greek adjective *kalos* meaning beautiful and the Greek noun *peza* meaning foot; the name refers to the orange webbing on the feet.

Hyla simmonsi new species
Fig. 3

Holotype.—KU 169554, an adult male, from the Río Calima, 1.5 km (by road) W of Lago Calima (04°00'N, 76°35'W, 1230 m), Departamento del Valle, Colombia, obtained on 14 September 1974 by William E. Duellman.

Paratopotypes.—KU 169555–57, 14–15 September 1974 by William E. Duellman; 169558–65, 31 May–1 June 1975 by William E. Duellman, John E. Simmons, and Linda Trueb; 181167, 24 March 1979 by William E. Duellman.

Diagnosis.—(1) Webbing extending to distal subarticular tubercle on

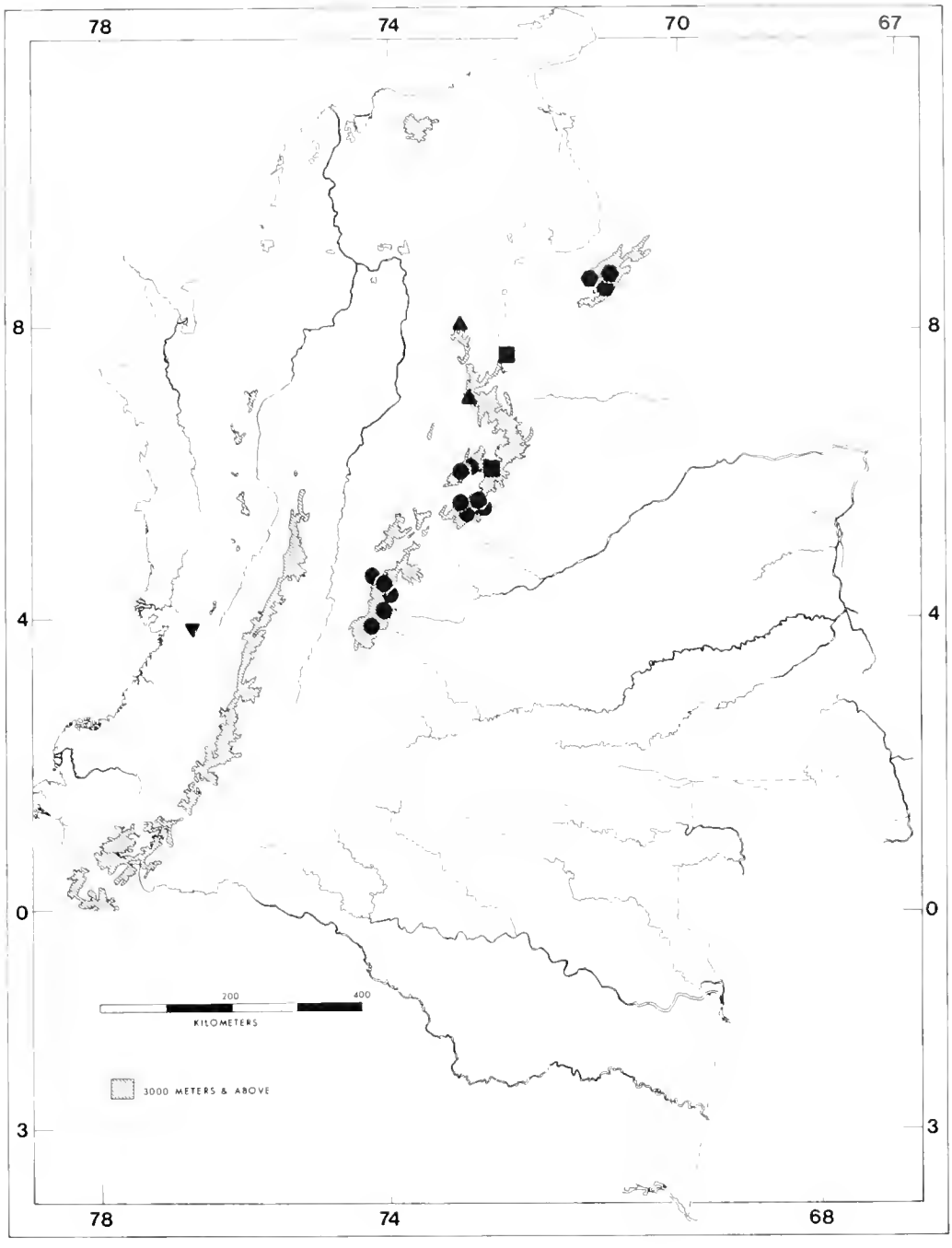

Fig. 2. Map of Colombia and adjacent Venezuela showing distributions of the species discussed in the text. Dots=*H. labialis*, square=*H. pelidna*, hexagons=*H. meridensis*, triangles=*H. callipeza*, inverted triangle=*H. simmonsi*.

fourth finger; (2) distal subarticular tubercle on four finger single or bifid; (3) ulnar fold absent; (4) inner and outer tarsal folds absent; (5) calcar absent; (6) snout in profile posteroventrally inclined from tip to margin of lip; (7) tympanic annulus barely evident; (8) supratympanic, tarsal, and supra-anal stripes absent.

Three other species in the *Hyla bogotensis* group lack pale tarsal and supra-

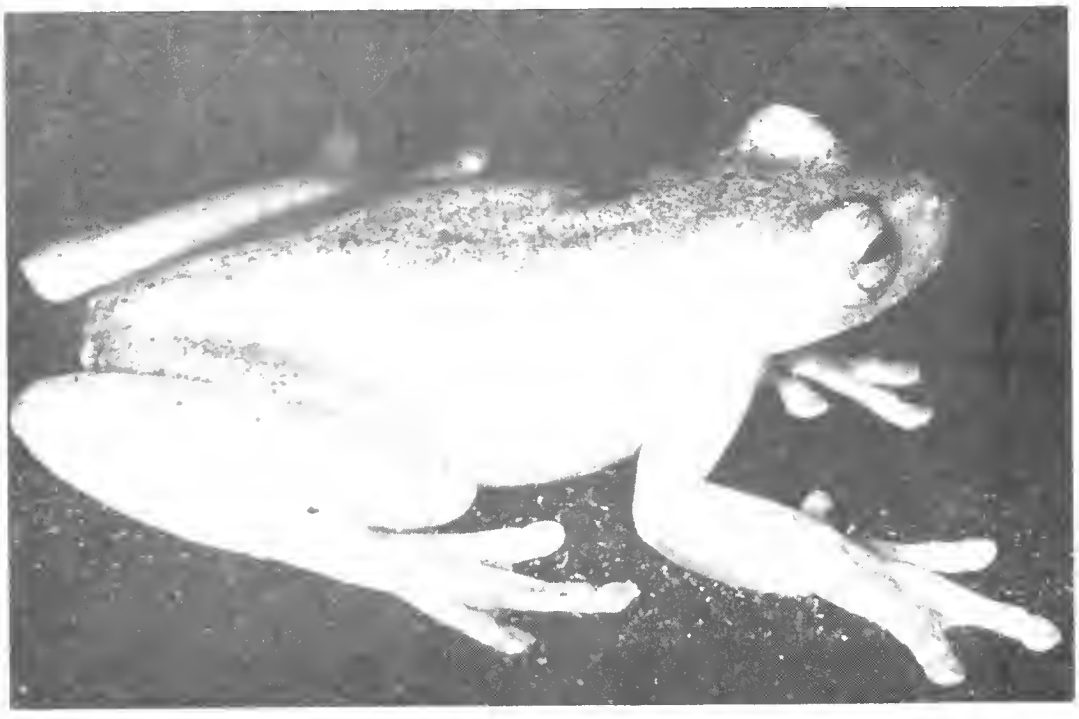

Fig. 3. Holotype of *Hyla simmonsi*, KU 169554, male, 35.0 mm SVL.

anal stripes. All of these (*H. bogotensis*, *jahni*, *platydactyla*) differ by having truncate or rounded snouts and distinct tympana. Moreover, *H. jahni* has a pale supratympanic stripe.

Description.—Body robust; head narrower than body, narrower than long; head width 31.3–32.5 ($\bar{x}$=31.8, n=13) percent of snout-vent length; snout moderately long, acuminate in dorsal view, inclined posteroventrally from tip to margin of jaw in profile, protruding beyond margin of lower lip; canthus round; loreal region slightly concave; lips not flared; nares about three-fourths distance from eyes to tip of snout, not flared, directed anterolaterally; internarial region flat to slightly convex; top of head flat; interorbital distance much greater than width of eyelid; supratympanic fold moderately heavy, shallowly arched from eye to scapular region, obscuring upper part of tympanum; tympanic annulus barely evident; tympanum separated from eye by distance slightly greater than diameter of tympanum, about 60 percent diameter of eye.

Forearm moderately robust; ulnar fold and tubercles absent; hand large with moderately short fingers bearing round discs; width of disc on third finger slightly greater than diameter of tympanum; relative length of fingers 1<2<4<3; lateral fringes on fingers; webbing vestigial between Fingers I and II; webbing formula for outer fingers **II**($1^1/2$–2)—3**III**(2–2^+)—2**IV**; subarticular tubercles low, round; distal tubercle on fourth finger weakly bifid or not; supernumerary tubercles subconical, numerous on proximal segments; palmar tubercle, small, diffuse, bifid; prepollical tubercle elliptical; nuptial

excrescences absent in males. Hind limbs moderately slender; tibia length 48.3–52.9 ($\bar{x}$=50.3, n=13) percent of snout-vent length; foot length 44.2–48.3 ($\bar{x}$=46.7, n=13) percent of snout-vent length; tarsal fold absent; inner metatarsal tubercle elongate, low; outer metatarsal tubercle absent; toes moderately short, bearing discs slightly smaller than those on fingers; relative length of toes 1<2<3=5<4; toes about three-fourths webbed; webbing formula **I**(1–1$^+$)—(1–2)**II**(1–1$^+$)—2**III**(1–1^1/2)—2**IV**2–1**V**; subarticular tubercles low, flat; supernumerary tubercles minute, present only on proximal segments.

Skin on dorsum and flanks smooth; skin on belly and proximal ventral surfaces of thighs granular; that on other surfaces smooth; mental gland occupying anterior third of chin in males; anal opening directed posteroventrally at midlevel of thighs; anal sheath moderately short; anal folds and tubercles absent. Vomerine odontophores prominent, transverse ridges between posterior margins of ovoid choanae, widely separated medially, each bearing 4–7 teeth ($\bar{x}$=5.3) in 12 males, 8 teeth in single female; tongue cordiform, shallowly notched posteriorly, barely free behind; vocal slits extending from midlateral base of tongue to angles of jaws; vocal sac single, median, subgular.

Color in preservative: All dorsal surfaces except Finger I and Toes I and II brown or tan with small brown spots; other surfaces cream. Pale cream canthal stripe evident in some individuals.

Coloration in life: Dorsum dull green with minute brown flecks; flanks and belly dull cream; mental gland pale green; other ventral surfaces grayish green; webbing tan; iris dull bronze.

Measurements: Measurements for 12 males (in mm with means in parentheses) followed by single female: snout-vent length 35.0–37.8 (36.6), 44.3; tibia length 17.8–19.0 (18.3), 23.0; foot length 16.5–17.6 (17.1), 20.7; head width 11.–12.3 (11.6), 14.2; head length 11.9–13.2 (12.4), 15.0; interorbital distance 4.1–5.2 (4.4), 5.5; eyelid width 2.7–3.5 (3.1), 3.8; eye-nostril distance 2.7–3.2 (3.0), 3.4; diameter of eye 3.2–3.5 (3.3), 3.6; diameter of tympanum 1.6–1.9 (1.8), 2.1.

Ecology and Distribution.—Calling males were found at night in March, May, June, and September on leaves of herbs, bushes, and vines overhanging a small (1–2 m wide) stream in a ravine in lower montane cloud forest. Most individuals were within 0.5 m of the water, but one was on a bush 3 m above the water and another was on a leaf of a *Heliconia* (Musaceae) 4 m above the water. The single female was on a bush at the edge of the stream on the night of 15 September 1974. The call consists of three short, whistle-like notes.

The species is known only from the type locality, a small tributary of the Río Calima on the Pacific versant of the Cordillera Occidental (Fig. 2). The type locality is reached by a dirt road that descends from the south end of the dam forming Lago Calima. The ravine in which the small stream is located is thickly vegetated with dense bushes, elephant-ear plants (*Xanthosoma*),

large *Heliconia*, and many vines (*Monstera*).

Etymology.—The specific name is a patronym for John E. Simmons, with whom I have shared many rewarding experiences (and some misfortunes) while searching for frogs in South America from 1971 through 1984.

HYLA LABIALIS GROUP

One of the new species is a member of this group that is defined as follows: (1) moderate-sized frogs with robust bodies with males attaining snout-vent lengths of 50 mm and females 55 mm; (2) mental gland absent in males; (3) dorsum green with or without diffuse black spots; groin and anterior surfaces of thighs blue or yellow, mottled with black; (4) digits bearing small discs; (5) toes about one-half to two-thirds webbed; (6) axillary membrane absent; (7) quadratojugal absent; (8) nasals small, slender, widely separated medially; (9) frontoparietal fontanelle large; (10) sphenethmoid broad, ossified anteriorly; (11) tadpoles with moderately short tail, deep fins, small anteroventral mouth bordered by papillae laterally and ventrally, and one upper and two lower rows of denticles; (12) advertisement calls consisting of a short series of guttural notes.

Hyla pelidna new species
Fig. 4

Holotype.—KU 181109, an adult male, from Betania (07°30'N, 72°27'W, 2220 m), Estado de Táchira, Venezuela, one of a series collected on 4 February 1979 by William E. Duellman and Amelia Diáz de Pascual.

Paratopotypes.—KU 181108 and 181110 collected on 2 and 4 February 1979 by William E. Duellman and Amelia Diáz de Pascual.

Referred Specimens.—KU 150776 from "Presidente," Departamento de Santander, Colombia, and KU 154988 from Chita, Departamento de Boyaca, Colombia, both collected by Hno. Nicéforo María in 1934.

Diagnosis.—(1) Snout-vent length of males <40 mm; (2) skin on dorsum shagreened with small tubercles; (3) axilla, groin, and hidden surfaces of limbs mottled black and blue.

Of the other species in the *Hyla labialis* group, *H. meridensis* differs from *H. pelidna* by having black and yellow mottling on the hidden surfaces of the limbs, and *H. labialis* is larger (males ±50 mm) and lacks tubercles on the dorsum.

Description.—Body moderately robust; head narrower than body, about as wide as long; head width 31.2–33.1 ($\bar{x}$=32.3, n=5) percent of snout-vent length; snout long, acutely rounded in dorsal view, round in profile; canthus round; loreal region barely concave; lips not flared; nares two-thirds distance from eyes to snout, slightly protuberant, directed dorsolaterally; internarial area depressed; top of head flat; interorbital distance slightly greater than

Fig. 4. Paratype of *Hyla pelidna*, KU 181108, male, 33.5 mm SVL.

width of eyelid; supratympanic fold moderately heavy, curved from eye to point above insertion of forelimb, obscuring upper part of tympanum; tympanic annulus distinct; tympanum separated from eye by distance nearly twice diameter of tympanum; diameter of tympanum about half diameter of eye.

Forearm robust; row of tubercles on ventrolateral edge of forearm; fingers moderately short; relative length of fingers 1<2<4<3; discs round; width of disc on third finger slightly greater than diameter of tympanum; webbing vestigial between Fingers I and II; webbing formula for outer fingers **II**(2--2)—(2^1/2–3)**III**(2^1/2–2)**IV**; subarticular tubercles large, round; distal tubercle on third finger weakly bifid; supernumerary tubercles large, round; palmar tubercle elevated, bifid; prepollical tubercle ovoid; nupital excrescences absent in males. Hind limb moderately robust, short; tibia length 46.6–49.2 ($\bar{x}$=48.2, n=5) percent of snout-vent length; foot length 44.7–47.4 ($\bar{x}$=45.9, n=5) percent of snout-vent length; inner tarsal fold extending length of tarsus; inner metatarsal tubercle elongate, elliptical; outer metatarsal tubercle absent; toes moderately long, slender; relative length of toes 1<2<3<5<4; discs slightly smaller than those on fingers; toes about two-thirds webbed; webbing formula I1—2II(1—2–2^1/2)III(1–1$^+$)—2IV2—1V; subarticular tubercles small, round; supernumerary tubercles small, round, present only on proximal segments.

Skin on dorsum shagreened with scattered small tubercles posteriorly on body; flanks areolate; skin on throat, chest, belly, and ventral surfaces of forelimbs and thighs coarsely granular; skin on other surfaces smooth; anal opening directed posteroventrally at midlevel of thighs; anal sheath moderately long; anal folds and tubercles absent. Vomerine odontophores prominent, narrowly separated medially, posteromedially inclined between ovoid choanae, each bearing 5 or 6 teeth; tongue cordiform, shallowly notched posteriorly, barely free behind; vocal slits extending from midlateral base of tongue to angles of jaws; vocal sac bilobate, situated posteriorly on throat.

Coloration in preservative: Dorsum and flanks dull brownish gray; axilla, groin, proximal anterior surfaces of thighs, posterior surfaces of thighs, and inner surfaces of tarsi and basal segments of toes I–III black with cream spots; venter creamy tan; vocal sac brownish gray.

Coloration in life: Dorsum bright green; venter white with bluish gray suffusion; axilla, groin, and posterior thighs mottled black and blue; iris deep bronze.

Measurements: Measurements of four males (in mm with mean in parentheses) followed by that of single female: snout-vent length 32.9–36.9 (34.4), 38.5; tibia length 15.7–17.2 (16.5), 18.9; foot length 14.9–16.5 (15.7), 18.0; head width 10.8–12.2 (11.2), 12.0; head length 10.6–12.1 (11.1), 12.0; interorbital distance 3.3–4.1 (3.6), 4.1; eyelid width 3.0–3.5 (3.2), 3.5; eye-nostril distance 2.6–2.9 (2.7), 3.2; diameter of eye 3.2–4.0 (3.6), 3.5; diameter of tympanum 1.7–1.8 (1.8), 2.0.

Ecology and Distribution.—At Betania, Venezuela, one individual was on a rock in a stream in remnants of cloud forest at night; two others were in bromeliads 2–5 m above the edge of the stream by day. One individual called from the collecting bag; the call was a low "wrank-ank-ank." The stream, the Quebrada Grande de Betania, flows into the Río Táchira about 300 m downstream from the area where the frogs were found. Most of the surrounding area is cultivated but many bromeliad-laden trees and dense growths of viney bamboo (*Chusquea*) exist along the stream. The type locality on the eastern slopes of Cerro Tamá is 71.6 km (by road) SSW of Rubio.

The species is known from the type locality at an elevation of 2220 m on the eastern slopes of the Cordillera Oriental and from two other localities in the Cordillera Oriental of Colombia (Fig. 2). Thus, the range extends southward from Cerro Tamá to Chita at an elevation of 3005 m on the southwestern slope of the Sierra Nevada del Cocuy.

Etymology.—The specific name is derived from the Greek adjective *pelidnos* meaning black and blue; the name is used in allusion to the coloration of the groin and thighs.

Remarks.—Cochran and Goin (1970) recognized three subspecies of *Hyla labialis* Peters (=*Hyla vilsoniana* Cope *auctorum*). One of these, *Hyla labialis platydactyla* Boulenger (with *Hyla vilsoniana meridensis* Rivero as

a synonym) has been recognized as a distinct species in the *Hyla bogotensis* group (Duellman, 1972). In addition to the typical subspecies, Cochran and Goin (1970) recognized *Hyla labialis krausi* Hellmich, named from Laguna de La Guitarra, Páramo de Sumapaz, Departamento de Cundinamarca; they referred three specimens from Gutiérrez, Departamento de Cundinamarca, to that subspecies. Although these localities are at the southern end of the range of *Hyla labialis*, I have not been able to detect differences between the holotype of *H. l. krausi* (ZSM 102/1937) and typical *H. labialis* from farther north in the Cordillera Oriental. Therefore, I consider *Hyla labialis krausi* Hellmich 1940 to be a synonym of *Hyla labialis* Peters 1863.

Hyla labialis is widely distributed in páramo and subparamo habitats at elevations of 2180–3400 m in the departments of Boyacá and Cundinamarca in the Cordillera Oriental of Colombia (Fig. 2).

Specimens of *"Hyla labialis"* from subparamo habitats in the Mérida Andes of Venezuela are smaller than typical *H. labialis* from Colombia. According to Pedro Durant at the Universidad de los Andes in Mérida, the groin and hidden surfaces of the thighs are mottled with black and yellow, not blue as in *H. labialis* and *H. pelidna*. This accounts for the "white spots or marbling" described for the holotype by Rivero (1961). Because of the morphological differences between specimens from the Mérida Andes and those from the Cordillera Oriental, and the presence of a dry lowland barrier, the Depressión de Cúcuta, that effectively separates the montane habitats of these ranges, I consider *Hyla vilsoniana meridensis* Rivero 1951 to be a distinct species, *Hyla meridensis*.

ACKNOWLEDGMENTS

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RESUMEN

Tres nuevas especies del género *Hyla* se nombran de los Andes de Colombia y Venezuela. Dos de estas especies están en el grupo *Hyla bogotensis*: *Hyla callipeza* de elevaciones de 1050–2850 m en la Cordillera

Oriental en el Departamento de Norte de Santander, Colombia, y *Hyla simmonsi* del Río Calima de una elevación de 1230 m de las laderas pacíficas de la Cordillera Oriental en el Departamento del Valle, Colombia. Una especie del grupo *Hyla labialis*, *Hyla pelidna*, se conoce de elevaciones de 2220–3003 m en la Cordillera Oriental de los Andes desde Cerro Tamá en Venezuela hasta la Sierra Nevada del Cocuy. En Colombia *Hyla labialis krausi* Hellmich 1940 se coloca en la sinonimía de *Hyla labialis* Peters 1863. *Hyla vilsoniana meridensis* Rivero 1961 es una especie distinto, *Hyla meridensis*, en los Andes de Mérida.

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